DiVesta Civil Engineering Associates, Inc.

June 22, 2020

Mr. Eric Joosten
Chairman
Environmental Protection Commission
Town of Darien
2 Renshaw Road
Darien, CT 06820

Re: Palladian Builders – 49 Sunswyck Road, Darien, CT

Dear Mr. Joosten:

The neighbor to the south of the above referenced property brought up some issues at the last EPC public hearing, dated June 3, 2020, that we would like to address. The first comment was that there are two drain pipes coming into the property. One is shown on the plans as a 12-inch CMP (corrugated metal pipe) which discharges runoff from two catch basins located on Sunswyck Road at the entrance to the above referenced property's driveway. The second pipe was missed by the surveyor and since the EPC meeting it has been field located and shown on the survey plan as well as on our plans. The second pipe is a 4-inch orangeburg pipe coming onto this property from the east. The pipe appears to be an overflow pipe from the neighbor's pond as well as a discharge pipe from portions of several other properties east of the above referenced property. The pipe goes under Sunswyck Road. It also appears someone placed a 6-inch corrugated flex pipe on the end to extend the pipe closer to the existing drainage ditch. At the time of our most recent site visit the pipe was not flowing. We did investigate the origin of the pipe. The pond in which the pipe is associated with was low and not anywhere near the invert of the overflow pipe. The 4-inch orangeburg pipe has a full flow capacity of .13 cfs (cubic feet per second). The 12-inch CMP has a full flow capacity of 4.46 cfs.

The second issue was how close the house/garage was to the drainage ditch. The closest point of the house is the garage which is over 23 feet to the drainage ditch and four feet above the ditch. Even if the claim by the neighbor is accurate, that the drainage ditch gets to be eight feet wide at a moderate rain event, it would not affect the garage because it will be just under 20 feet to the drainage ditch if we assume that the ditch overflows the banks equally. There will be just under 4 feet of free board from the garage to the assumed water surface elevation in the drainage ditch. The average slope of the drainage ditch is over five percent and it is a well-defined ditch. We prepared drainage calculations on the open drainage ditch to determine the depth of flow and approximate width of the flow at two partial cross sections. One cross section was taken near wetlands flag number 16 and the other cross section was taken near flag number 15. The full flow capacity of the two pipes would be 4.46 cfs. There are other contributing areas to the drainage ditch but they are minor and would not have a significant effect on the runoff. Cross section A-A has a flow depth of .38 feet with an approximate flow width of 4.9 feet and cross section B-B has a flow depth of .36 feet with an approximate flow width of 7 feet. Both cross sections are less then what the claim is.

It was suggested that the footing drain sump pump discharges would have an impact on the wetlands. The footing drains discharge to the detention basin located behind the house on the southern lot. Based on a 25-year storm event the detention only has approximately 1.8-inches of water in it. The runoff does not reach the control outlet therefore the whole storm is infiltrated into the surrounding ground. The detention system consist of Cultec Contactor 100, these units are 12.5-inches tall therefore there is approximately 10.7 inches of storage capacity in the units for the additional water from the footing drains. The runoff will be metered out through the control outlet thus reducing the flow as well. We estimate that the foundation could be in the groundwater between 10-inches to 3.7 feet based on the proposed site development plan. The northern lot we did not encounter groundwater in the test holes within the house footprint. Mottling was present. Mottling is an indicator of potential seasonal high groundwater. Mottling was encountered at 47-inches below existing grade. Therefore the foundation could possibly be in 3 feet of groundwater. The northern detention system has been oversized to accommodate the extra footing drain water. There will be approximately 2-inches of extra storage within the system for the footing drain water. There is less potential of water in this foundation due to no actual groundwater present.

Based on our hydrology calculations for pre development, the fresh meadow approach was used per the zoning regulations. The peak rate of runoff for a 50 year design storm was 11.4 cfs (cubic feet per second) and the post development after detaining the runoff from the driveways, roof areas and the impervious area as well as some of the lawn area will have a peak rate of runoff for the 50 year design storm of 11.3 cfs. The post development peak rate of runoff for all storms analyzed (2, 10, 25 and 50 year storms) will be equal to or less than the pre development peak rate of runoff. The hydrology calculations were reviewed and approved by the Town's consultant.

It is our professional opinion that discharging the footing drain water into the detention systems will not have an adverse impact to the surrounding wetlands or properties.

The area of the existing basement is approximately 318 square feet.
It is our professional opinion that the proposed site development plan can be constructed in such a manner that it would not have an impact on the existing wetlands nor the existing drainage ditch.

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Very Truly Yours,
DiVesta Civil Engineering Associates, Inc.

Douglas DiVesta

Douglas DiVesta, PE
President

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DD/dd
20-015 – ltr Joosten 06-15-20

DiVesta Civil Engineering Associates Inc.
Roxbury, Connecticut

Subject
49 SUNSWYCK ROAD
DARIEN, CT

Date: 6/22/20
Comp. By: DD

Job No.: 20-015
Checked By: DD

EXISTING DRAINAGE DITCH
CROSS SECTION A-A

WETTED PERIMETER (WP)

NORTH SIDE

$$c^2 = a^2 + b^2$$
$$c = \sqrt{a^2 + b^2}$$
$$= \sqrt{(1)^2 + (7)^2}$$
$$c = 7.07'$$

BOTTOM WIDTH = 1'

$$WP = 7.07 + 1 + 4.12'$$
$$WP = 12.19 \ ft$$

SOUTH SIDE

$$c = \sqrt{a^2 + b^2}$$
$$= \sqrt{(1)^2 + (4)^2}$$
$$c = 4.12'$$

CROSS SECTIONAL AREA A-A
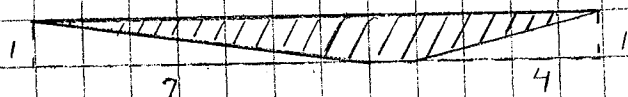
NORTH SIDE

$$A = \frac{bh}{2}$$
$$A = \frac{(7)(1)}{2}$$
$$A = 3.5 \ ft^2$$

SOUTH SIDE

$$A = \frac{bh}{2}$$
$$A = \frac{(4)(1)}{2}$$
$$A = 2 \ ft^2$$

RECTANGLE AREA

$$A = L \times H$$
$$= (12 \times 1)$$
$$A = 12 \ ft^2$$

CROSS SECTIONAL AREA
$$A = 12 \ ft^2 - 3.5 \ ft^2 - 2 \ ft^2$$
$$A = 6.5 \ ft^2$$

DiVesta Civil Engineering Associates Inc.
Roxbury, Connecticut

Subject: 49 SUNSWICK ROAD DARIEN, CT

Date: 6/22/20

Job No. 20-015

Comp. By: DD

Checked By: DD

FLOW DEPTH = .38 ft (PER NATURAL CHANNEL CALCULATION
                       (SEE ATTACHED SHEET)

TRAPEZOIDAL AREA CALCULATIONS

$$A = Y \times \left(\frac{B + b}{2}\right)$$

A = AREA (ft²)   (6.5)
Y = HEIGHT OR DEPTH (.38)
B = TOP OF TRAPEZOID B
b = BOTTOM OF TRAPEZOID (1)

$$6.5 = .38 \times \left(\frac{B + b}{2}\right)$$

$$13 = .38 B + .38 b$$

$$12.62 = .38 B$$

$$4.75' = B$$

THEREFORE:
    THE WIDTH OF THE DRAINAGE DITCH AT THIS CROSS
SECTION AT A Q_full OF 4.6 cfs EQUAL 4.09 ft.

Drainage Ditch 06/22/20 ~ SECTION A-A

49 Sunswyck Road, Darien

Natural Channels

CIVIL TOOLS PRO
English Units
06-22-2020 10:41:42

Data Entered

Flow Rate	=	4.61 cfs
Channel Slope	=	0.0500 V:H

Distance (ft)	Elevation (ft)	Manning's N
0.00	45.00	0.035
20	44	0.035

Results

Flow Depth	=	0.38 ft
Flow Rate	=	4.61 cfs
Channel Slope	=	0.0500 V:H
Wetted Area	=	1.46 sq ft
Wetted Perimeter	=	7.66 ft
Flow Velocity	=	3.15 ft/s
Froude's Number	=	1.27
Flow Regime	=	super-critical flow

DiVesta Civil Engineering Associates Inc.
Roxbury, Connecticut

Subject
49 SUNSWYCK ROAD
DARIEN

Date 6/22/20   Job No. 20-015

DD   DD

Comp. By   Checked By

EXISTING DRAINAGE DITCH
SECTION B-B

WETTED PERIMETER (WP)

NORTH SIDE

$$C^2 = \sqrt{a^2 + b^2}$$
$$= \sqrt{(1)^2 + (4)^2}$$
$$C = 4.12'$$

SOUTH SIDE

$$C = \sqrt{a^2 + b^2}$$
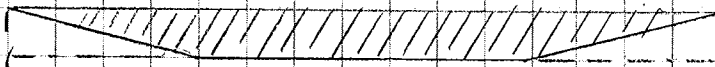$$\sqrt{(1)^2 + (4)^2}$$
$$C = 4.12'$$

BOTTOM WIDTH = 7'

$$WP = 4.12 + 7 + 4.12$$
$$WP = 15.2'$$

CROSS SECTIONAL AREA @ B-B

NORTH SIDE

$$A = \frac{BH}{2}$$

$$A = \frac{(4)(1)}{2}$$

$$A = 2 \, ft^2$$

SOUTH SIDE

$$A = 2 \, ft^2$$

RECTANGLE AREA

$$A = L \times H$$
$$= 15 \times 1$$
$$A = 15 \, ft^2$$

CROSS SECTIONAL AREA

$$A = 15 ft^2 - 2ft^2 - 2ft^2$$
$$A = 11 ft^2$$

DiVesta Civil Engineering Associates Inc.
Roxbury, Connecticut

Subject
49 SUNSWYCK ROAD
DARIEN

Date 6/22/20   Job No. 20-015
DD   DD
Comp. By   Checked By

FLOW DEPTH = .36 ft   UPER NATURAL CHANNEL CALCULATION
SEE ATTACHED

TRAPEZOIDAL AREA CALCULATIONS

$$A = Y \times \left(\frac{B+b}{2}\right)$$

$$11 = .36 \times \left(\frac{B+7}{2}\right)$$

$$22 = .36 B + 2.52$$

$$19.48 = .36 B$$

$$7.01' = B$$

THEREFORE:
THE WIDTH OF THE DRAINAGE DITCH AT THIS CROSS
SECTION AT A Qfull OF 4.01 cfs EQUALS 7 ft.

Drainage Ditch Section B-B 06/22/20

49 Sunswyck Road, Darien

Natural Channels

CIVIL TOOLS PRO

English Units

06-22-2020 14:55:36

Data Entered

Flow Rate	=	4.61 cfs
Channel Slope	=	0.0330 V:H

Distance (ft)	Elevation (ft)	Manning's N
0.00	46.00	0.035
30	45	0.035

Results

Flow Depth	=	0.36 ft
Flow Rate	=	4.61 cfs
Channel Slope	=	0.0330 V:H
Wetted Area	=	1.89 sq ft
Wetted Perimeter	=	10.66 ft
Flow Velocity	=	2.44 ft/s
Froude's Number	=	1.02
Flow Regime	=	super-critical flow

48"TULIP

GARAGE
(TO BE REMOVED)

50 FT. UPLAND REVIEW AREA

135.6'±

12"CMP

TP

INV.=46.0

20"OAK

18"SWEET GUM

16"PINE

18"SWEET GUM

18"SWEET GUM

S 64°02'00" E 151'18'

INV=56.5

16"PINE

16"PINE

15"MAPLE

36"SWEET GUM

36"SWEET GUM

24"OAK

172.69'

25'

12"OAK

12"SWEET GUM

18"SWEET GUM

18"SWEET GUM

12"OAK

150 SQUARE

12"MAPLE

65.7'±

S 38°16'00"

40

24"MAPLE

12"OAK